ALARM MONITORING USING THE SMOKE SENSOR

A Project Report for Industrial Internship
In the partial fulfilment for the award of the degree
of

BACHELOR OF TECHNOLOGY

COMPUTER SCIENCE AND ENGINEERING

In the

NARULA INSTITUTE OF TECHNOLOGY

Under the Guidance of

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CERTIFICATE FROM SUPERVISOR

This is to certify that**,** Student have successfully completed the project titled "**ALARM MONITORING USING THE SMOKE SENSOR**" under my supervision during the period from 5/02/2024 to 10/02/2024 which is in partial fulfilment of requirements for the award of the **BACHELOR OF TECHNOLOGY** degree and submitted to the Department of **NARULA INSTITUTE OF TECHNOLOGY**.

Moupia Bakshi

_____

Signature of the Supervisor

Date: 10/02/2024

Name of the Project Supervisor: Miss Moupia Bakshi

ACKNOWLEDGEMENT

The achievement that is associated with the successful completion of any task would be incomplete without mentioning the names of those people whose endless cooperation made it possible. Their constant guidance and encouragement made all our efforts successful.

We take this opportunity to express our deep gratitude towards our project mentor, [**Miss Moupia Bakshi**] for giving such valuable suggestions, guidance and encouragement during the development of this project work.

Last but not the least we are grateful to all the faculty members of Ardent Computech Pvt. Ltd. for their support.

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INTRODUCTION

The Internet of Things (IoT) has revolutionized the way we interact with and monitor our surroundings. One compelling application of IoT technology is the development of a smart smoke alarm system. Traditional smoke alarms have been crucial in providing early detection of potential fire hazards, but IoT-based smoke alarms take this to the next level by offering enhanced connectivity, intelligence, and remote monitoring capabilities.

An IoT-based smoke alarm leverages interconnected devices and sensors to not only detect smoke but also communicate and share information in real-time. This interconnectedness allows for a more proactive and efficient response to potential fire incidents. Through the integration of IoT, these smart smoke alarms offer features such as remote monitoring, instant alerts to homeowners or authorities, and the ability to integrate with other smart home devices for a comprehensive safety network.

This introduction sets the stage for exploring the various components and functionalities of an IoT-based smoke alarm system, highlighting how it goes beyond the traditional models to provide a more advanced and interconnected approach to fire safety.

COMPONENTS USED

- ESP 8266
- MQ2 gas sensor
- Jumper wires
- Buzzer
- LEDs

DESCRIPTION

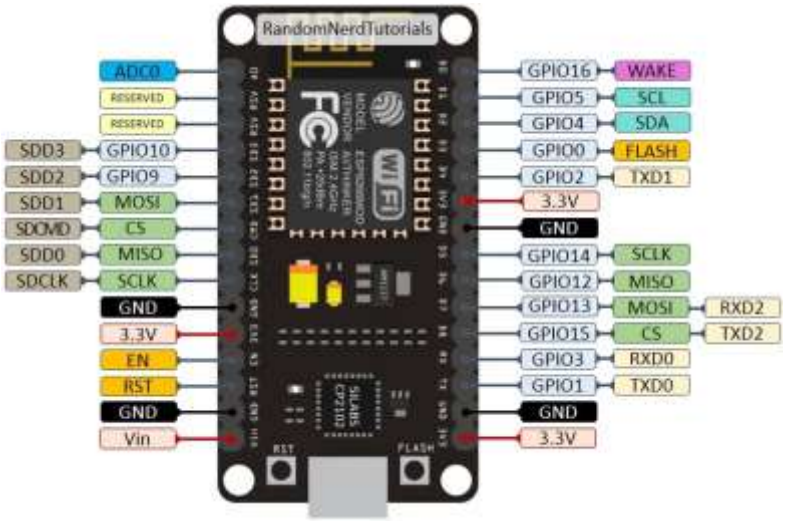
ESP 8266

The integration of the ESP8266 microcontroller within an IoT-based smoke alarm system represents a significant leap forward in enhancing fire safety through advanced connectivity and intelligent monitoring. The ESP8266, a versatile and cost-effective WiFi-enabled microcontroller, serves as the core component, enabling seamless communication and data exchange in the Internet of Things ecosystem.

By incorporating the ESP8266 into the design of a smoke alarm, we harness the power of WiFi connectivity to enable real-time monitoring and reporting of potential fire incidents. This integration empowers the smoke alarm to transmit critical information to designated recipients, such as homeowners or emergency services, in a swift and efficient manner.

The ESP8266's capabilities extend beyond traditional smoke alarms by facilitating remote accessibility and control. Users can receive instant alerts on their smartphones or other connected devices, allowing for timely response and intervention. Additionally, the ESP8266's compatibility with various IoT platforms enables seamless integration into smart home networks, offering a holistic approach to safety.

This exploration delves into the intricacies of leveraging the ESP8266 microcontroller in an IoT-based smoke alarm, shedding light on how this technology not only detects smoke but also transforms traditional alarms into intelligent, connected devices that redefine the landscape of home safety.

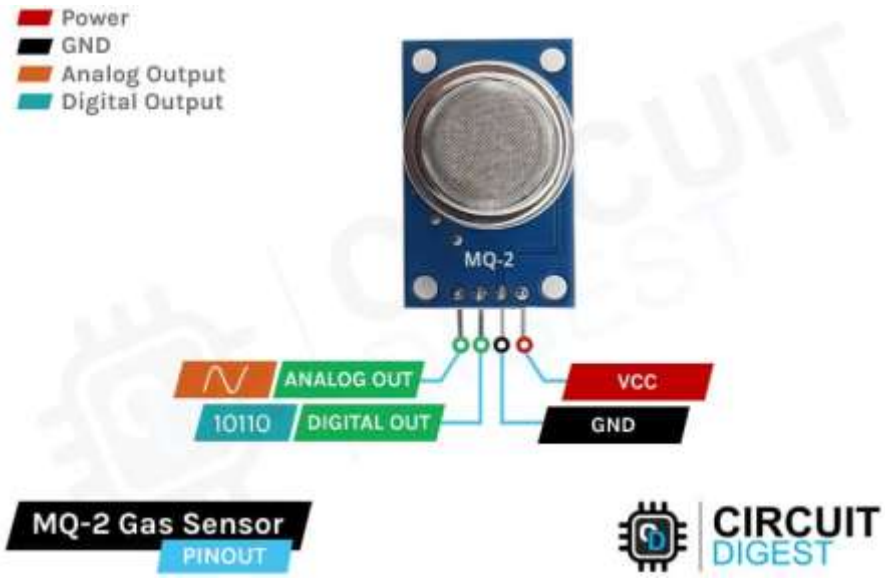


MQ2 gas sensor

In the realm of IoT-based smoke alarm systems, the integration of advanced sensors plays a pivotal role in enhancing the detection and response capabilities. One such crucial component is the MQ2 gas sensor. The MQ2 sensor is renowned for its ability to detect various gases, including smoke, methane, propane, and carbon monoxide. Its sensitivity and versatility make it an ideal choice for creating a sophisticated IoT-based smoke alarm system.

The MQ2 gas sensor operates on the principle of detecting changes in resistance when exposed to different gases. In the context of a smoke alarm, it becomes a reliable tool for early detection of smoke particles, signaling the potential onset of a fire. The integration of this sensor into an IoT framework allows for real-time monitoring and instant communication of detected threats.

This introduction sets the stage for delving into the specific functionalities of the MQ2 gas sensor within an IoT-based smoke alarm system. Exploring its working principles and how it contributes to the overall intelligence and responsiveness of the system will provide a comprehensive understanding of its role in ensuring enhanced safety and security.



Jumper wires

It seems like you're mentioning "jumper wires" in the context of an IoT-based smoke alarm. Jumper wires are typically used in electronics and prototyping to create connections between different components on a breadboard or circuit. In the context of an IoT-based smoke alarm, jumper wires might be used to establish connections between various sensors, microcontrollers, and other electronic components within the system.

Here's a brief overview of how jumper wires could be involved in an IoT-based smoke alarm system :

1. Sensor Connectivity: Jumper wires may be used to connect smoke sensors or detectors to a microcontroller (such as Arduino or Raspberry Pi) within the smoke alarm system. This facilitates the transfer of data from the sensors to the processing unit.

2. Microcontroller Connections: Within the IoT system, jumper wires can be employed to connect the microcontroller to other essential components, such as WiFi or Bluetooth modules. This enables the transmission of data to a central server or a connected smart home network.

3. Power Supply: Jumper wires are commonly used to establish connections between the power source and various components, ensuring that the smoke alarm system receives the necessary electrical power.

4. Integration with IoT Platform: If the IoT-based smoke alarm is part of a larger IoT ecosystem, jumper wires might be used to connect the microcontroller to the IoT platform, allowing for remote monitoring and control.

It's important to note that the specifics of jumper wire usage would depend on the design and architecture of the particular IoT-based smoke alarm system. Always refer to the system's documentation or schematic diagrams for accurate information on the use of jumper wires in your specific setup.

Buzzer

The implementation of a buzzer in an IoT-based smoke alarm adds an audible alert component to the system, enhancing its effectiveness in notifying occupants of potential fire hazards. The buzzer serves as an integral part of the alarm system, providing a real-time audible warning in the event of smoke detection.

In the context of an IoT-based smoke alarm, the buzzer operates in conjunction with the smoke detection sensor. When the sensor detects the presence of smoke or elevated levels of particulate matter in the air, it triggers the buzzer to emit a loud and distinct sound. This immediate audible alert serves as a crucial means of notifying individuals within the vicinity about the potential fire threat.

The integration of the buzzer in the IoT-based smoke alarm system aligns with the goal of ensuring a swift and effective response to fire incidents. Beyond just sending notifications through digital channels, such as mobile applications or emails, the audible alarm ensures that occupants are alerted even if they are not actively monitoring digital devices. This dual-notification approach, combining digital alerts and audible signals, enhances the overall safety and reliability of the IoT-based smoke alarm system.

LEDs

When designing an IoT-based smoke alarm system, incorporating LEDs (Light Emitting Diodes) can be a valuable component to enhance the user interface and provide visual indications. LEDs serve as a simple yet effective means to communicate various status updates and warnings to users. Here are some ways LEDs can be integrated into an IoT-based smoke alarm:

1. Power Indication:

- Use a power indicator LED to show that the smoke alarm is actively receiving power and is operational. A steady glowing green LED can indicate that the device is functioning properly.

2. Normal Operation:

- A periodic blinking green LED can signify that the smoke alarm is in its normal operating state. This provides users with a visual confirmation that the system is actively monitoring for potential smoke or fire hazards.

3. Smoke Detection:

- When smoke is detected, a rapidly flashing red LED can immediately grab the attention of users. This visual alert serves as an additional warning alongside the audible alarm, ensuring that occupants are promptly aware of the potential danger.

4. Battery Status:

- If the smoke alarm is battery-powered, different LED patterns or colors can indicate the battery status. For example, a slowly fading or blinking red LED may indicate a low battery, prompting users to replace it.

5. Connectivity Status:

- In an IoT-based system, an LED can be used to indicate the connectivity status. A steady blue LED might signify a stable connection to the internet or a home automation hub, while a blinking blue LED could indicate that the device is actively trying to establish a connection.

6. Troubleshooting:

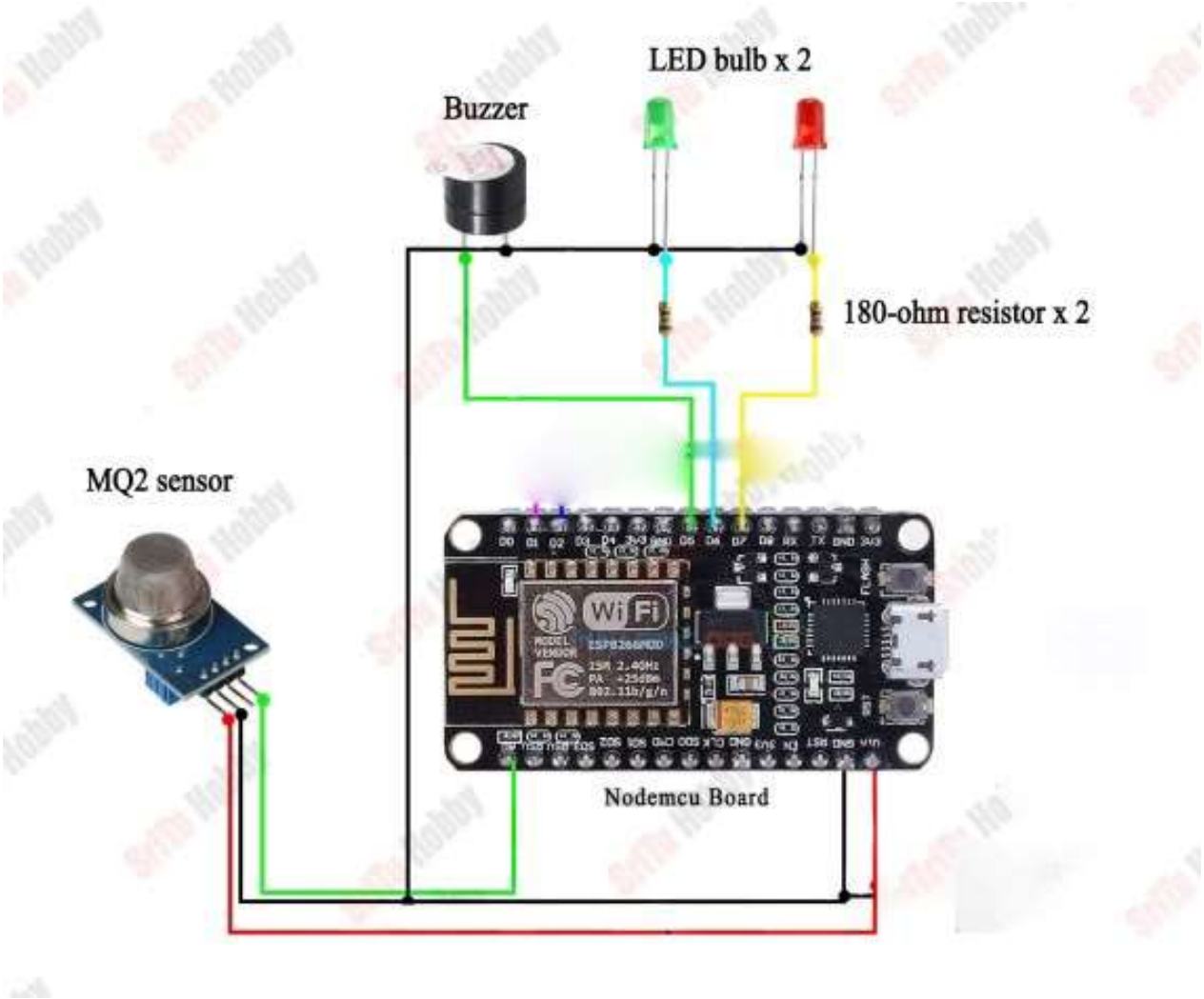
- Use specific LED patterns or colors to convey diagnostic information in case of malfunctions or errors. This can assist users or technicians in identifying and addressing issues with the device.

7. Silent Mode:

- If the smoke alarm has a silent mode or night mode, an LED can provide a visual confirmation when this mode is activated or deactivated. This ensures users are aware of the device's current configuration.

By integrating LEDs into the IoT-based smoke alarm, users can receive immediate visual cues, complementing the audible alarms and improving overall safety awareness. The use of different colors, patterns, and intensities allows for a versatile visual communication system, making it more accessible and user-fri

CIRCUIT DIAGRAM :

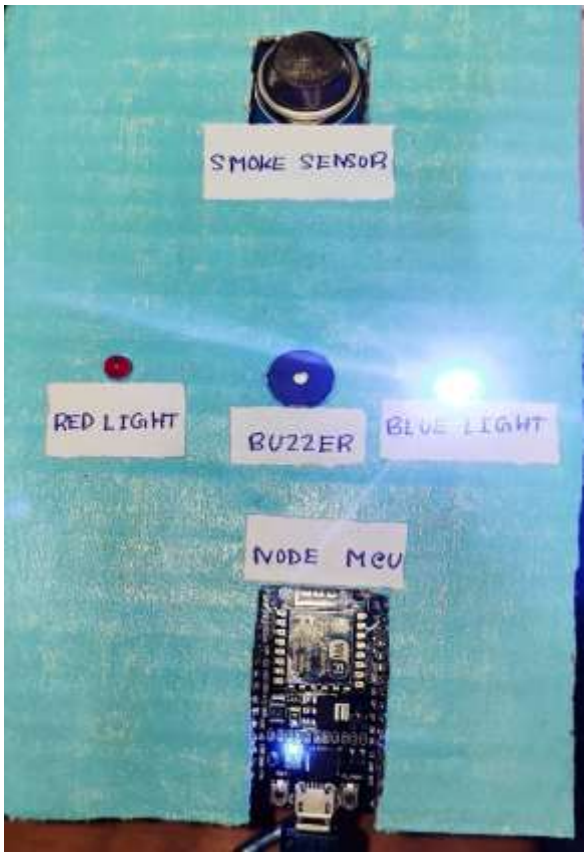


CODE:

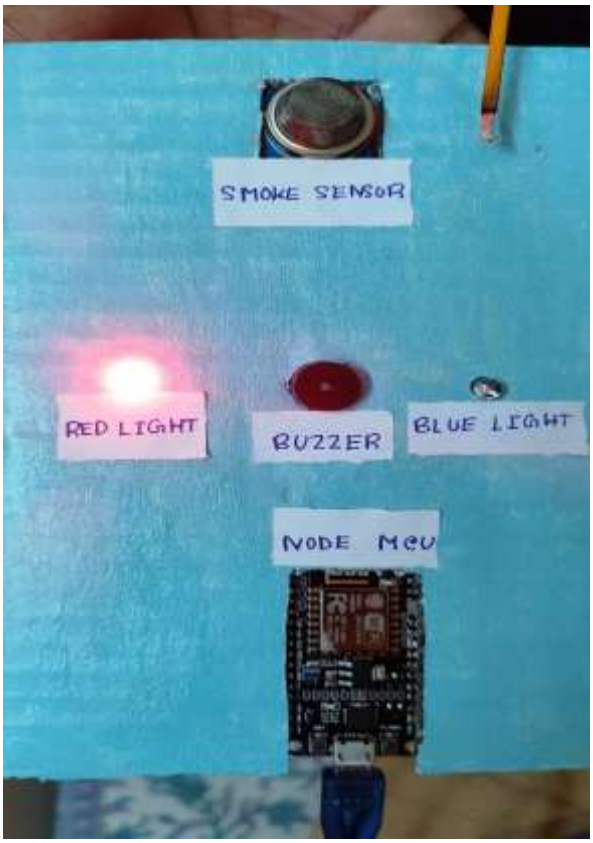
```
//Change Blynk Authenticaation Details
#define BLYNK_TEMPLATE_ID "TMPL3VwXVzSjv"
#define BLYNK_TEMPLATE_NAME "Smoke Detector Alarm"
#define BLYNK_AUTH_TOKEN "BbOj4BLUGa20N8lc_JqOzs8n3mDsGRQ4"

#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

char auth[] = BLYNK_AUTH_TOKEN;

char ssid[] = "Systumm";  // Enter your wifi name
char pass[] = "210804@NIT";  // Enter your wifi password
int smokeA0 = A0;
int data = 0;
int sensorThres = 100;

BlynkTimer timer;

void sendSensor(){

 int data = analogRead(smokeA0);
 Blynk.virtualWrite(V0, data);
  Serial.print("Pin A0: ");
  Serial.println(data);

 if(data > 100)     // Change the Trashold value
  {
    Blynk.logEvent("smoke_detector_alarm","Smoke Alert");
    digitalWrite(D0, HIGH);
    digitalWrite(D1, HIGH);
    digitalWrite(D2, LOW);
```

```
  }

 else  // Change the Trashold value
  {
    digitalWrite(D0, LOW);
    digitalWrite(D1, LOW);
    digitalWrite(D2, HIGH);
  }
}

void setup(){
  pinMode(D0, OUTPUT);
  pinMode(D1, OUTPUT);
  pinMode(smokeA0, INPUT);
   Serial.begin(115200);
  Blynk.begin(auth, ssid, pass);
  //dht.begin();
  timer.setInterval(2500L, sendSensor);
}

void loop(){
  Blynk.run();
  timer.run();
}
```

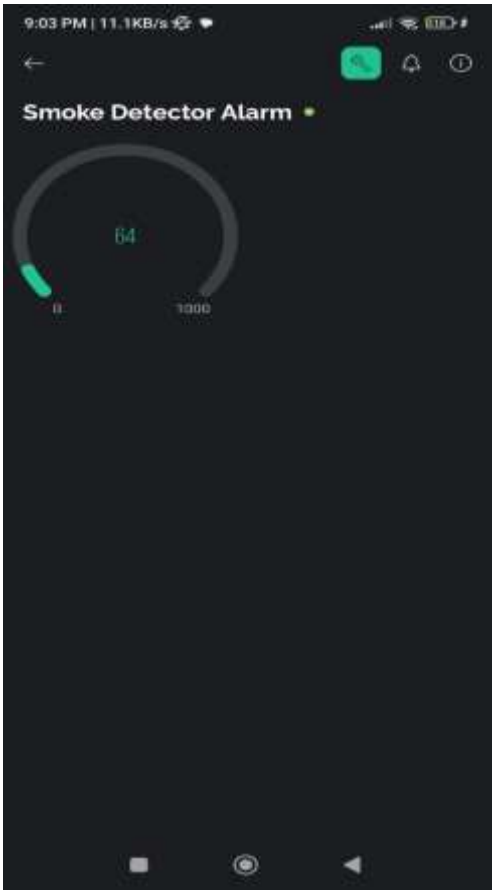
MODEL



IN NORMAL CONDITION



WHEN SMOKE IS DETECTED

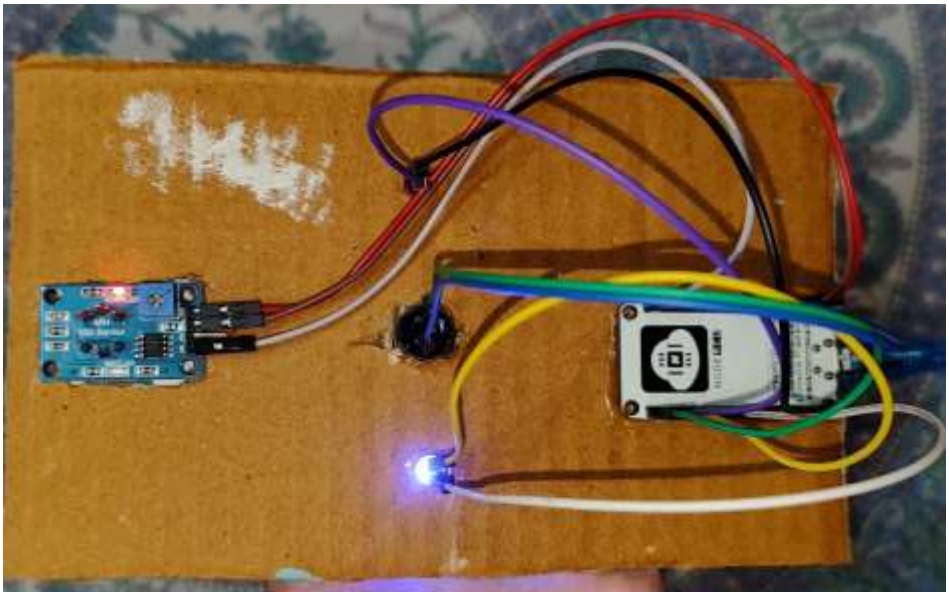


MOBILE APP

WHEN SMOKE LEVEL RISES

EMAIL NOTIFICATION

MOBILE NOTIFICATION



WIRES CONNECTION

OTHER APPLICATIONS OF IOT

Home Is Where the Smart Is:

EVM Machine-to-machine communication, and you understand you're not the most tech-savvy consumer, it's impossible that you've missed the abundance of home automation products filling the shelves and ads of every home improvement store. Suddenly an ordinary errand for light bulbs will leave you wondering if your lamp could send you a message alerting you that the light bulb needs to be replaced. Furthermore, if your lamp is talking to you, could your refrigerator and sprinkler system be too? Experts say: Yes, the possibilities are endless. If that's the case, where do you begin?

Any day-to-day, repeatable process is automatable with smart home applications. The greater the control andflexibility of these processes, the more energy and cost savings the resident experiences, which are factors anyone who pays utilities strives to moderate. The smart home revolution is likely to be more of an evolution, with the incorporation of one or two home systems at a time, gradually automating our households through smart mobile devices.

However, with these elements of efficiency comes the question of ease of use. Will it bring you enjoyment or exasperation? With so many brands and models already available in an ever- growing market, how do you know which is best for you?

Lighting Control: Leaving the Dark Ages and Stepping Into the Light:

Smart lighting allows you to control wall switches, blinds, and lamps, but how intuitive is a lighting control system? It turns out, quite; its capabilities are extensive. You're able to schedule the times lights should turn on and off, decide which specific rooms should be illuminated at certain times, select the level of light which should be emitted, and choose how particular lights react through motion sensitivity, as seen with Belkin's WeMo Switch + Motion, which is both affordable and easy to use with its plug-and-play simplicity.

HVAC Regulation: No Longer Burned by Your Heating Bill:

As fuel costs rise and the availability and sustainability of our resources becomes a greater concern, heating/cooling our homes efficiently is less of a budgetary bonus and more of a necessity. Over the past year, smart thermostats and automated home heating systems have become more readily available and easily incorporated into any home. Heating and cooling our homes consume an average of 50% of energy costs yearly, making daily HVAC regulation progressively rewarding. Maintaining a substantial lead among the nearly non-existent competition, the Nest Learning Thermostat, learns your heating and cooling preferences over time, eliminating the need for programming and is accessible from your smartphone app. With automated HVAC you are able to reduce the heat when a room is unoccupied, and increase or decrease it at specific times based on your schedule and occupancy.

Lawn Irrigation Systems: The Grass is Always Greener:

A lush and healthy lawn is a source of pride for most homeowners, but the weather doesn't always cooperate and provide the adequate elements for a flourishing landscape. For decades we've relied on sprinkler systems to keep our yards at peak presentation, but at what cost? The average American home spends approximately 30% of their daily water usage on lawn and garden maintenance. Nearly half of that amount is wasted due to inefficiency. If you apply that statistic to the national average, up to 4.5 billion gallons of water is wasted per day through ineffective watering methods. If we reflect upon the monetary impact of this, it results in Americans spending over a thousand dollars a year in water, with a portion of that being wasted. The global effects are even greater when you consider the growin concern over climate change and the dramatic decrease in agricultural natural resources. However, sprinkler control systems, like Skydrop, are providing water regulation through real-time communication with local weather data. If a rainstorm develops and deposits two inches of rainwater on your lawn, the automated sprinkler detects the saturation and disables its scheduled watering. Conversely, the system will be alerted to dry conditions and supply the necessary amount of nourishment, without over-watering.

Smart Appliances: What's for Dinner?

Will smart kitchen appliances actually make you a better cook? Maybe. Smart refrigerators, such as LG's Smart ThinQ, allow you to scan grocery store receipts and keep an inventory of your items, and alerts you if an item is about to expire. More impressively, it suggests recipes based on your refrigerator's contents and lets you know when you need to replace items. Smart ovens sync with your smartphone and automatically preheat to the correct temperature based on a recipe selected from your database. While these appliance options seem a bit superficial and convenience based, there is a conservation factor as well. By automating your kitchen appliances and making them accessible from your smart device, you're able to sever the electricity supplied to unused appliances and reduce your energy consumption and costs. Consider reducing the number of appliances the average household owns; this could save a substantial amount of money

Security Systems: Knock, Knock…

Who's there? The Internet of Things. While efficiency and conservation are certainly IoT benefits, its potential to have improved control over home security is a primary focus. Smart locks, like Kwikset's Kevo, a Bluetooth enabled electronic deadbolt, and various connected home security systems, such as iSmartAlarm, offer a variety of features including door and window sensors, motion detectors, video cameras and recording mechanisms. All of which are connected to a mobile device and accessible via the cloud, thus enabling you to access real-time information on the security status of your home. Naturally, there is a great deal of scrutiny regarding the level of trust in controlling your home's security system via a mobile device, but it begs earnest exploration when weighing the potential benefits and peace of mind it provides homeowners.

CONCLUSION

In conclusion, the IoT-based smoke alarm project represents a significant advancement in enhancing fire safety measures through the integration of Internet of Things (IoT) technology. The implementation of interconnected devices and intelligent sensors has not only elevated the traditional smoke alarm's capabilities but has also paved the way for a more responsive and connected approach to home and industrial safety.

The project successfully demonstrated the potential of real-time smoke detection and communication through IoT devices. The use of mediums such as mobile applications, emails, or push notifications has greatly improved the immediacy of alerts, enabling homeowners, building managers, and even emergency services to respond promptly in case of a fire incident.

The incorporation of IoT also facilitates remote monitoring, providing users with the ability to check the status of their smoke alarm system anytime and anywhere. This level of accessibility contributes to a sense of security and control, allowing users to take preventive measures even when they are away from their homes or workplaces.

Furthermore, the project's adaptability to integrate with other smart home devices opens up possibilities for creating a comprehensive safety network within a connected living environment. This holistic approach ensures that various aspects of home automation can collaborate seamlessly, enhancing overall safety and security.

In conclusion, the IoT-based smoke alarm project not only addresses the shortcomings of traditional smoke alarms but also sets the stage for future developments in the realm of smart home safety. By harnessing the power of IoT, we can create a safer and more responsive environment, reducing the potential risks associated with fire incidents. This project marks a crucial step forward in leveraging technology for the betterment of our daily lives and the protection of our homes and workplaces

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